

## SOLAR ACTIVITY

Some solar effects are obvious—for example, seasonal weather changes and the temperature differences between the equator and the poles. Short period fluctuations in solar activity are not particularly important in these connections. Less obvious but of equally great significance are the effects of solar activity on the upper atmosphere. Unusual solar radiation, either in intensity or in kind, strongly influences the upper atmosphere and, indirectly, radio communications, navigational systems, and many other normal civilian activities.

Overall solar activity is measured in terms of the 11-year sunspot cycle; many other solar phenomena, such as enormous flares, prominences, and other types of active regions, vary according to the same time scale. Individual sunspots or other active regions on the sun have lifetimes of a few days to a few months, changing rather gradually during that time. Spurts of activity, common during high activity states of the 11-year cycle, occur in some individual solar regions and last up to a few hours or a few days, with individual outbursts or flares lasting only for a few minutes.

Variations in each of these activities are associated with events on the earth. Partly for this reason the IGY program was timed to occur close to the peak of the sunspot activity so that the intensity and frequency of the associated geophysical events in the high atmosphere would be increased and could be correlated with the sources of these disturbances on the sun.

Solar activity during the IGY will be studied with a network of observing stations which will measure not only events occurring in the range of visible frequencies, but also those at radio frequencies. Stations have been spaced around the world so that a continuous 24-hour watch of the surface of the sun can be made. In some locales stations are more closely spaced in order to assure continuous monitoring of the sun during periods when cloudiness or other difficult "seeing conditions" might cause the patrol to be interrupted. These stations will make counts of the numbers and sizes of sunspots, will study the sun's corona for unusual events and greater intensification of activity, and will record the enormous solar flares which sometimes shoot out hundreds of thousands of miles at tremendous speeds. Other stations will make recordings at radio frequencies of solar noise, which is an indication of unusual activity on the sun.

While these types of solar events are known to correlate directly with ionospheric and geomagnetic disturbances, auroral displays, and cosmic ray showers, the details of the correlations remain hazy. The systematic observations of the sun are expected to provide a more direct understanding of the relations of solar and terrestrial events. At the same time it is planned to use this network of patrol stations as a means to forecast or anticipate unusual geophysical disturbances in the high atmosphere. An international "Warning Service" will be established. Special world intervals will be singled out during which observations of terrestrial phenomena will be accelerated. During these intervals geomagnetists, cosmic-ray specialists, and physicists in the aurora and ionospheric programs will greatly accelerate the number of their normal recordings and observations. A communications network is being established which will broadcast the onset or presence of disturbed conditions in the high atmosphere, signaling observers to proceed with their special studies.